

### **ABSTRACT OF THE DISCLOSURE**

1       An electro-optical switch implemented in coupled photonic crystal waveguides is  
2 disclosed. The switch is proposed and analyzed using both a finite-difference time-domain  
3 (“FDTD”) method and a plane wave expansion (“PWM”) method. The switch may be  
4 implemented in a square lattice of silicon posts in air, as well as in a hexagonal lattice of air  
5 holes in a silicon slab. Switching occurs due to a change in the conductance in the coupling  
6 region between the photonic crystal waveguides, which modulates the coupling coefficient and  
7 eventually causes switching. Conductance may be induced electrically by carrier injection or  
8 optically by electron-hole pair generation. The electro-optical switch has low insertion loss and  
9 optical crosstalk in both the cross and bar switching states.